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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/709,588

05/17/2004

Yu-Wen Chen

10790-US-PA

3587

31561

7590

04/13/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER

MANGRUM, AMY

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 04/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/709,588	CHEN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Amy Mangrum	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Wu et al. (6,187,613 B1).

As to **claim 1**, Wu et al. describes placing a metal foil used for heat dissipation on a flip chip that has been connected to a substrate and injecting an encapsulant into the space between the metal foil, the flip chip, and the substrate (See Figs. 1-3, See also claim 1). Wu et al. further describes curing the encapsulant (See claim 3).

As to **claim 2**, Wu et al. describes using an injection needle to make the hole to inject the encapsulant into the space between the metal foil, the flip chip, and the substrate (See Fig. 2, item 53, See also col. 3, line 34).

As to **claim 3**, Wu et al. shows the injection needle positioned outside the perimeter of the chip and adjacent to the chip (See Figs. 1 and 3).

As to **claim 7 and 8**, Wu et al. describes using a thermoplastic material in the epoxy resin (See col. 1, lines 54-55).

As to **claim 9**, Wu et al. shows the underfill connecting the heat sink to the substrate (See Figs. 1-3).

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, and 5-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Brandenburger (6,979,600 B2).

As to **claim 1**, Brandenburger describes placing a heat spreader, which has a through hole outside the perimeter of the chip, onto a flip chip that has been connected to a substrate and injecting an underfill into the space between the heat spreader, flip chip, and substrate (See Fig. 4, See also claims 6 and 8). Brandenburger further describes curing the resin (See col. 3, lines 24-26).

As to **claim 3**, Brandenburger shows a through hole positioned outside the perimeter of the chip and adjacent to the chip (See Fig. 4, item 504).

As to **claim 5**, Brandenburger describes using a sealant material on the outer edge of the through hole, which can be used to define a cavity for the underfill to be injected into (See Fig. 4, item 502).

As to **claim 6**, Brandenburger describes using a thermal interface material between the heat spreader and the chip (See Fig. 4, item 503).

As to **claim 7 and 8**, Brandenburger describes using a thermosetting epoxy resin as the underfill material (See col. 2, lines 58-59).

As to **claim 9**, Brandenburger describes the underfill going beyond the boundaries of the bumped region (See col. 3, lines 18-20).

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Claims 1, 3-7, and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Ma et al. (6,617,682 B1).

As to **claim 1**, Ma et al. describes placing a heat spreader, which has a through hole outside the perimeter of the die, onto a die that has been connected to a substrate and an underfill encapsulation material is fed into a gap between the heat spreader, die, and substrate (See Fig. 7, See also claim 10). Brandenburger further describes curing the underfill encapsulation material (See col. 5, lines 41-42).

As to **claim 3**, Ma et al. shows a through hole positioned outside the perimeter of the die and adjacent to the die (See Fig. 7, item 322).

As to **claim 4**, Ma et al. describes the heat spreader being fabricated from a material having a coefficient of thermal expansion substantially equivalent to a coefficient of thermal expansion of the die (See claim 11, see also col. 3, lines 10-15).

As to **claim 5**, Ma et al. describes using pillars on the outer edge of the through hole, which can be used to define a cavity for the underfill encapsulation material to be injected into (See Fig. 7, items 212 and 214, see also col. 4, lines 45-49).

As to **claim 6**, Ma et al. describes using a heat conductive adhesive between the heat spreader and the die (See Fig. 6, item 225, see also claim 12).

As to **claim 7**, Ma et al. describes using an epoxy-based material as the underfill encapsulation material (See col. 5, lines 63-65).

As to **claim 9**, Ma et al. shows the underfill connecting the heat sink to the substrate (See Figs. 7, item 340).

**Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chiu et al. (6,600,232 B2)

Mitchell (6,602,740 B1)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amy Mangrum whose telephone number is (571) 272-8061. The examiner can normally be reached on Monday-Friday, 9-6, EST.

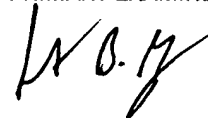
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

 4/11/06

AMM  
04/11/2006

SCOTT B. GEYER  
PRIMARY EXAMINER

 4-12-06